UM1651
User manual

VL6180X premium evaluation kit (EVK) hardware user manual

Overview

The VL6180X proximity sensor premium EVK demonstrates the basic proximity, ranging and light sensing capabilities of the VL6180X sensor.

References

1. *VL6180X premium evaluation kit (EVK) software user manual* (DocID026336)
2. *VL6180X datasheet* (DocID026171)

Figure 1. VL6180X premium evaluation kit

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1 Introduction

The VL6180X premium evaluation kit (EVK) can be used for the following:

- evaluation of the VL6180X proximity and ambient light sensor, allowing different glass heights and aperture sizes to be tested
- integration of the VL6180X with an external customer host

Figure 2. Premium EVK isometric view

By default the premium EVK is configured to operate using the USB port to a standard PC. The software with the premium EVK demonstrates the basic proximity, ranging and light sensing capabilities of the VL6180X sensor. Internally an STM32 acts as a USB to I^2C bridge allowing the PC to communicate with the sensor.

By reconfiguring a bank of switches, the STM32 is bypassed and the customer interface port is enabled, allowing any suitable host to communicate with the sensor. This is shown in *Table 1*.

Table 1. Switch settings

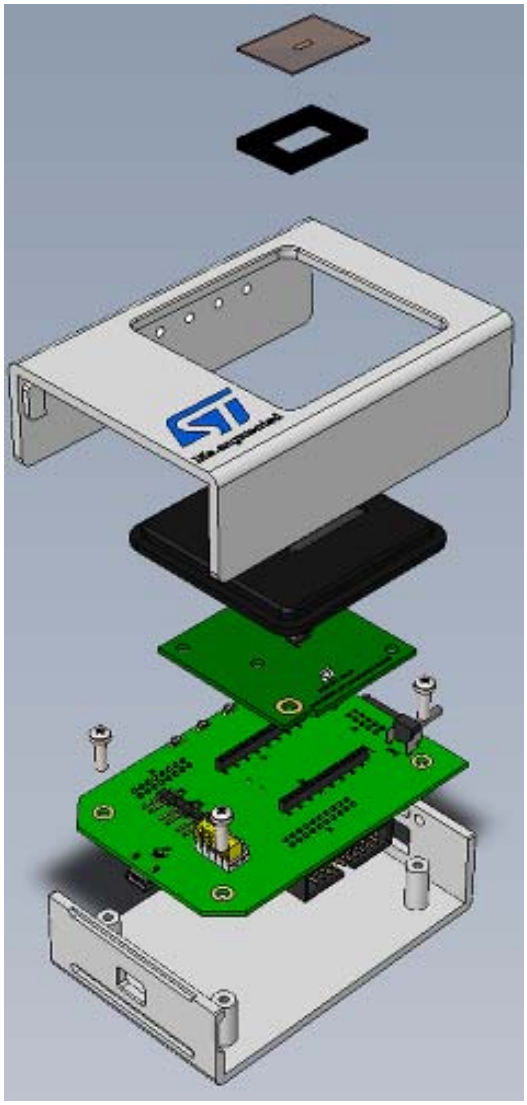
Switch	Description	Default
SW3	Off: Customer host mode On: USB / STM32 mode	On
SW4		
SW5		
SW6		
SW7		

2 Premium EVK contents

The premium EVK is made up from the following components:

- box base with rubber feet and pillars
- box lid with clipping mechanism
- PCB1480B screwed onto box base
- PCB1453C
- glass holder with foam insert
- glass spacer – seven different thicknesses
- glass – four identical glass samples
- Calibration tool
- Min USB cable

Figure 3. Premium EVK exploded view



3 Hardware

3.1 Calibration tool

A calibration tool is delivered with the VL6180X premium evaluation kit

Figure 4. Calibration tool description

The way the different parts of the calibration tool are put together is describes in *Figure 5* and *Figure 6*.

The calibration target allows to perfectly set the distance measurement.

- *Figure 5* shows how to position the calibration tool to measure a distance of 50mm to do the offset calibration
- *Figure 6* shows how to position the calibration tool to measure a distance of 100mm to do the cross-talk calibration

Figure 5. Offset calibration to 50 mm using the white side of the calibration tool

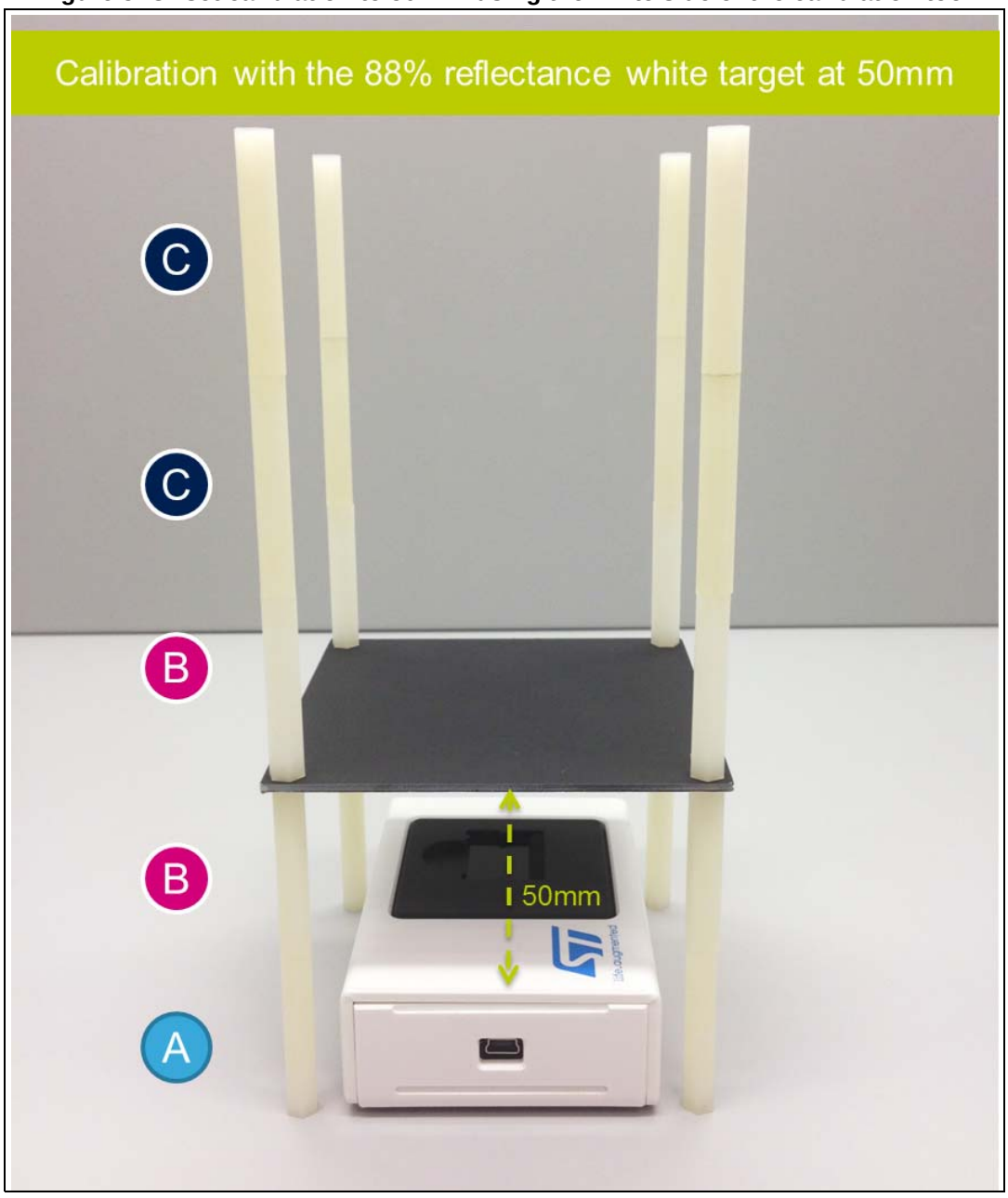
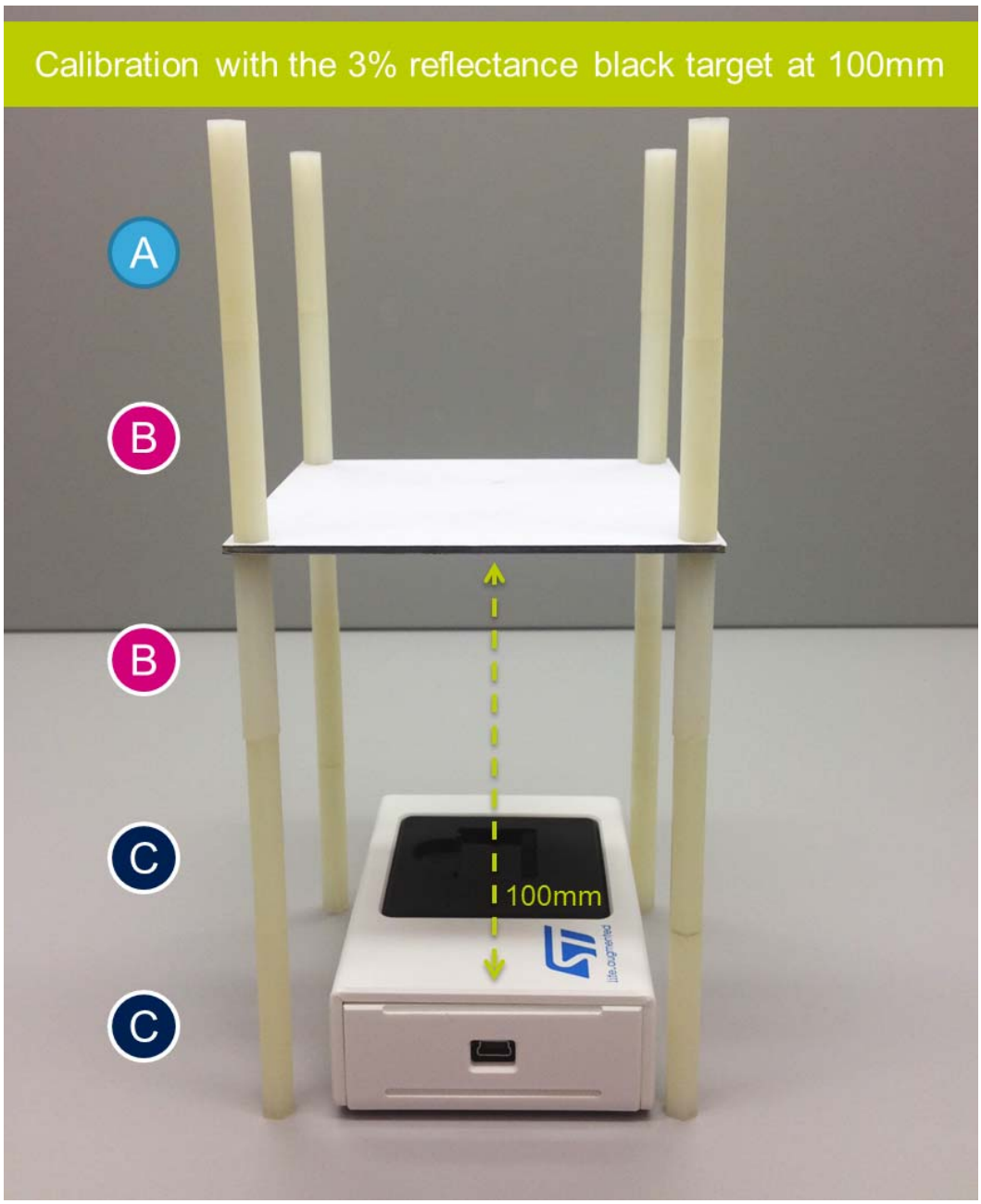


Figure 6. Cross-talk calibration to 100 mm using the black side of the calibration tool



3.2 PCB

3.2.1 Customer interface port (J3)

This port enables the end user to interface to the VL6180X sensor using a suitable host. The only signals required to communicate with the sensors are I^2C, power and ground. The GPIO pins can be used as interrupts.

The header is compatible with the Aardvark I^2C interface kit from Total Phase.

Figure 7. Customer interface port (J3)

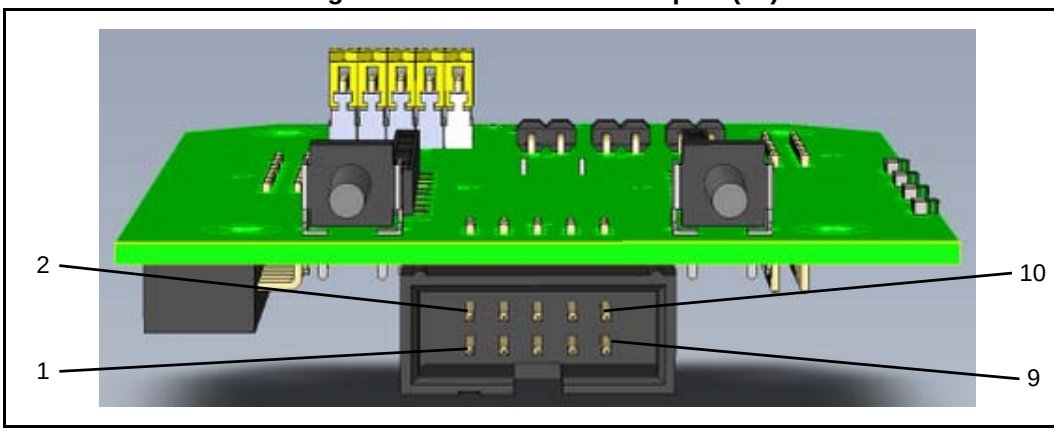


Table 2 describes the pin outs of the customer interface port.

Table 2. Customer interface port (J3)

Pin number	Signal name	Description	Notes
1	SCL	PC clock line	
2	GND	Ground	
3	SDA	PC data line	
4	5V0	5 volt supply	Provides board power
5	GPIO[0]	VL6180X GPIO	By default, configured as RESETn (active low reset)
6	NC	Not connected	
7	GPIO[1]	VL6180X GPIO	
8	2V8_MICRO_EN	Enable signal	Enables 2V8 regulator for STM32
9	2V8_SENSOR_EN	Enable signal	Enables 2V8 regulator for VL6180X
10	GND	Ground	

3.2.2 JTAG header (J4)

This port is for programing the STM32. STMicroelectonics do not anticipate that this port will be used by the end user, but the signals are described here for information.

This header is compatible with the RLink debugger programmer from Raisonance.

Figure 8. JTAG header (J4)

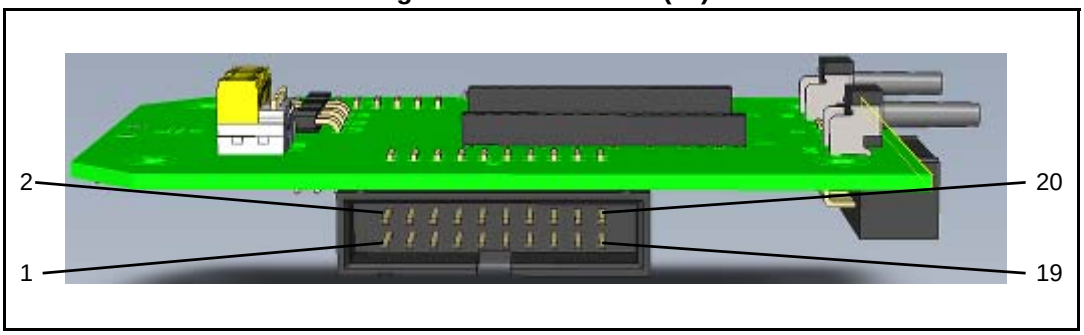


Table 3 describes the pin outs for the JTAG header.

Table 3. JTAG header (J4)

Pin number	Signal name	Description	Notes
1	2V8_MICRO	Target voltage	
2	2V8_MICRO	Target voltage	
3	JTAG_RESET_N_MISO	Reset	
4	GND	Ground	
5	TDI	JTAG signal	
6	GND	Ground	
7	TMS	JTAG signal	
8	GND	Ground	
9	TCK	JTAG signal	
10	GND	Ground	
11		Not used	
12	GND	Ground	
13	TDO	JTAG signal	
14	GND	Ground	
15	RST_N	Reset	
16	GND	Ground	
17		Not used	
18	GND	Ground	
19		Not used	
20	GND	Ground	

3.2.3 Debug header (J6)

The debug header permits easy interrogation of the I^2C and GPIO signals.

Although not currently implemented, the header permits the debug of the GPIO signals from up to four VL6180Xs connected through the two main connectors J1 and J2.

Note: At the time of writing, no plug-in board with multiple sensors exists.

Figure 9. Debug header (J6) on underside of board

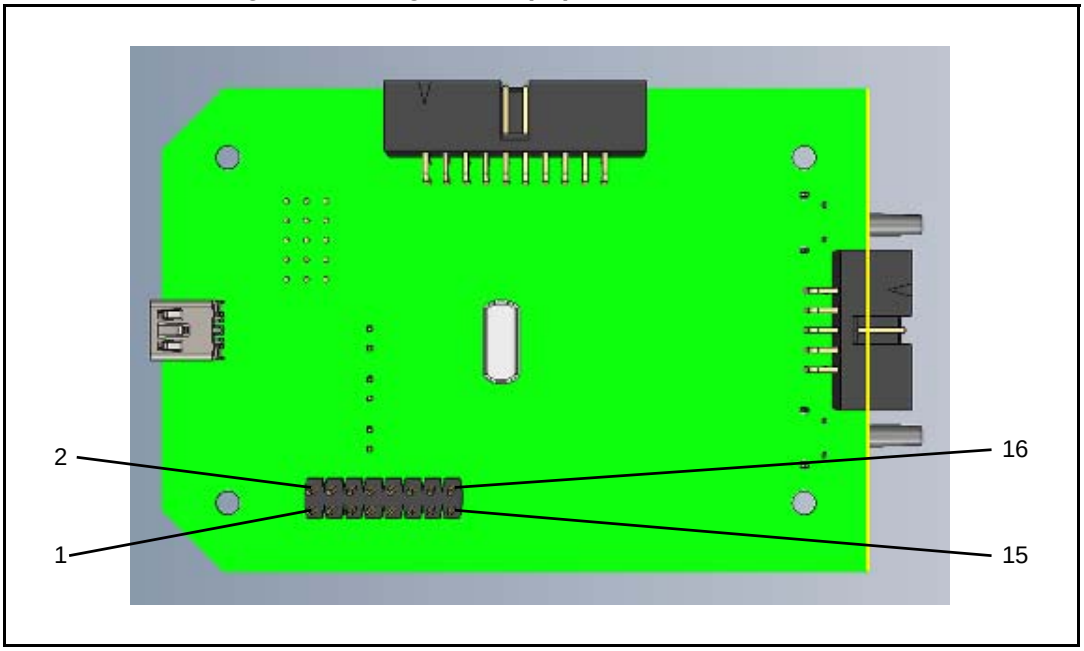


Table 4 describes the pin outs for the debug header.

Table 4. Debug header

Pin number	Signal name	Description	Notes
1		Not connected	
2		Not connected	
3	SCL	PC clock	
4	SDA	PC data	
5	GPIO[0]	VL6180X GPIO	By default, configured as RESETn
6	GPIO[1]	VL6180X GPIO	
7	GPIO_B[0]	Second VL6180X GPIO	For possible future expansion. Not currently implemented.
8	GPIO_B[1]	Second VL6180X GPIO	For possible future expansion. Not currently implemented.
9	GPIO_C[0]	Third VL6180X GPIO	For possible future expansion. Not currently implemented.
10	GPIO_C[1]	Third VL6180X GPIO	For possible future expansion. Not currently implemented.
11	GPIO_D[0]	Fourth VL6180X GPIO	For possible future expansion. Not currently implemented.
12	GPIO_D[1]	Fourth VL6180X GPIO	For possible future expansion. Not currently implemented.
13	ATEST1	Analog test signal	

Table 4. Debug header (continued)

Pin number	Signal name	Description	Notes
14	ATEST2	Analog test signal	
15	CPOBS	Analog test signal	
16	GND	Ground	

3.3 Reset buttons

There are two reset buttons on the premium EVK: Micro RST and Sensor RST.

- Micro RST. This is connected to the STM32 reset line and resets the STM32 to power on state.
- Sensor RST: This is connected to the two 2V8 voltage regulators that supply the VL6180X sensor. Pressing this button performs a complete power down reset of the VL6180X.

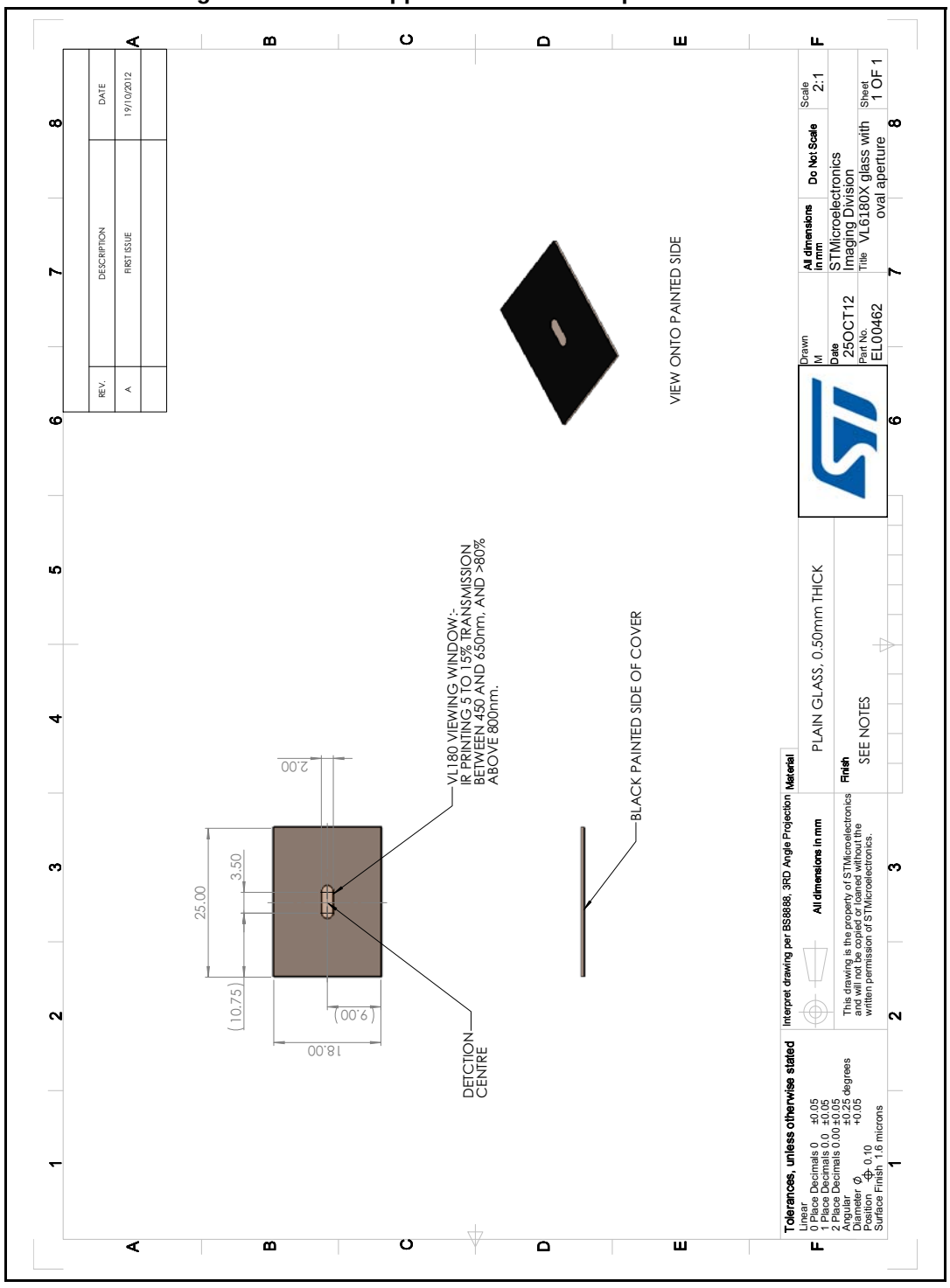
3.4 Glass and spacers

There are seven thicknesses of spacer supplied in the kit: 0.1, 0.3, 0.5, 1.0, 1.6, 2.0 and 2.4 mm.

The glass and spacer are held in place with a foam strip. It may be necessary to glue the thinner spacers to the glass to provide mechanical rigidity as the thinner spacers are quite flexible.

The glass supplied is as per drawing EL00462 (see *Figure 10*). The interaction between the IR aperture in the glass, the viewing cones of the sensor and the air gap between the sensor and glass is important. Experimenting with the air gap or building new glass samples will affect the performance of the sensor.

Figure 10. Glass supplied with VL6180X premium EVK



3.5 Schematics

3.5.1 VL6180X premium EVK board schematic

Figure 11. VL6180X premium EVK board schematic (page 1/2)

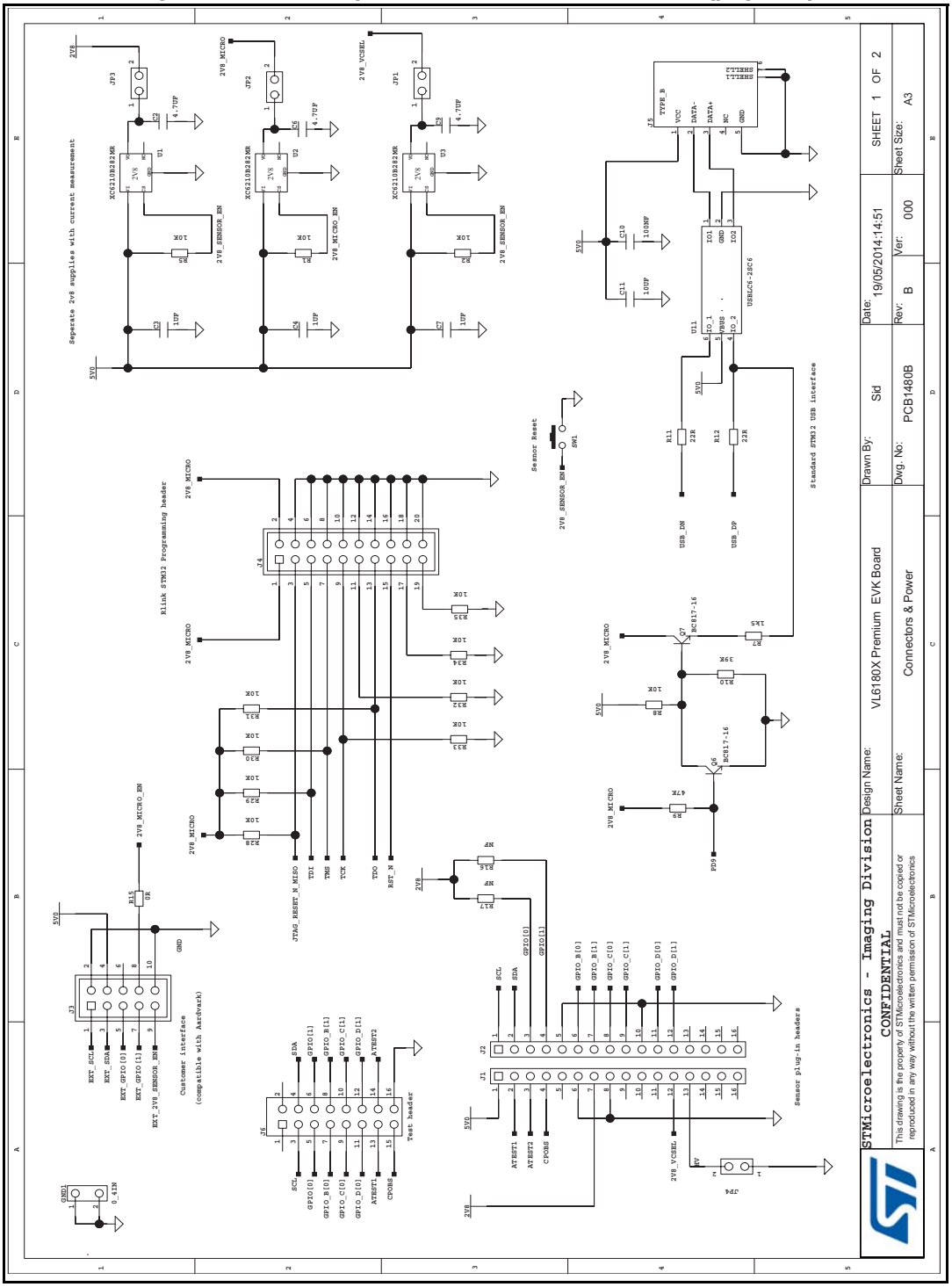
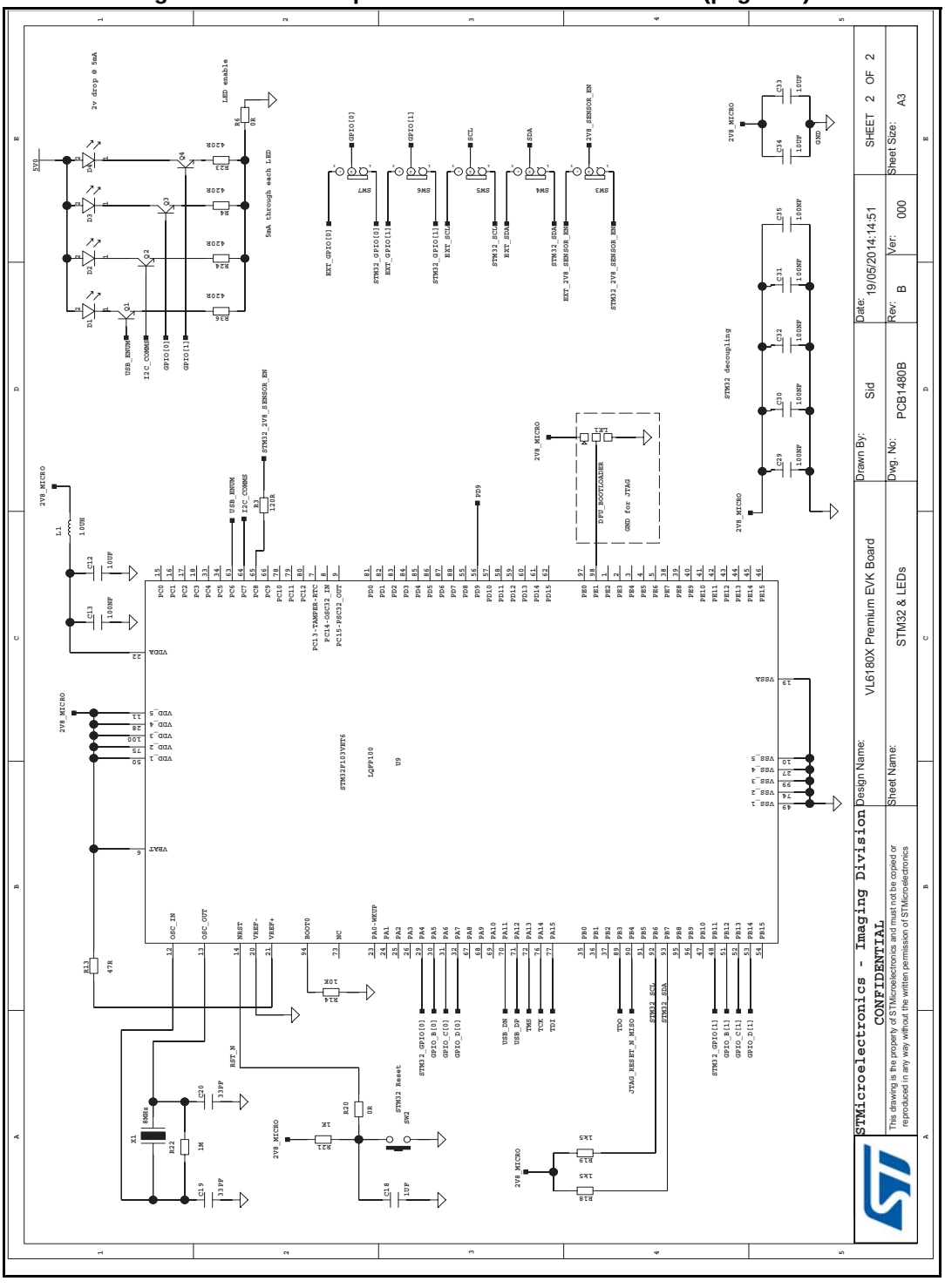
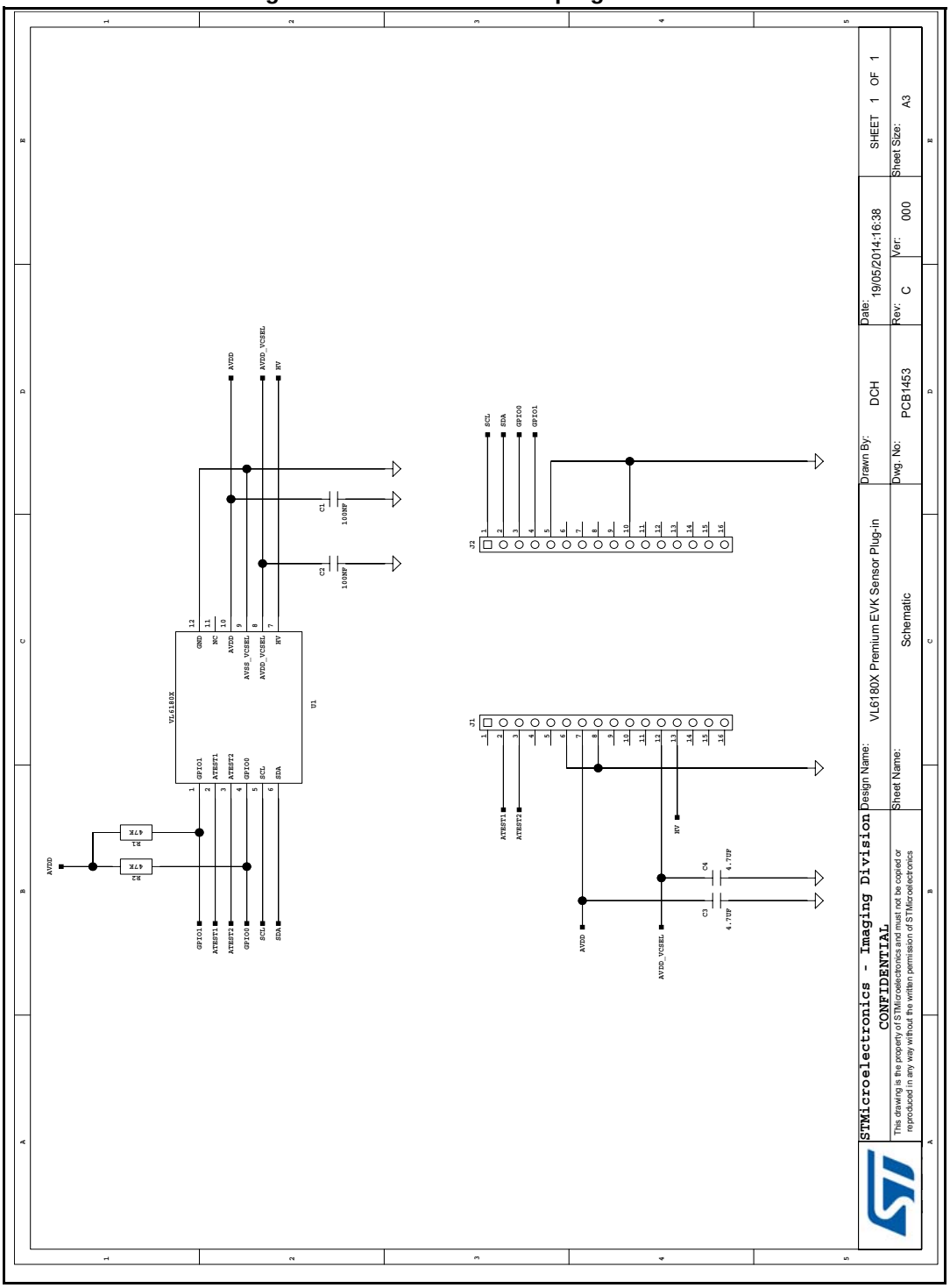


Figure 12. VL6180X premium EVK board schematic (page 2/2)



3.5.2 VL6180X module plug-in board

Figure 13. VL6180X module plug-in board



4 Revision history

Table 5. Document revision history

Date	Revision	Changes
25-Oct-2013	1	Initial release.
15-May-2014	2	Change document title
16-May-2014	3	Correct typo error
10-Jun-2014	4	Change document properties
01-Oct-2014	5	Update Disclaimer

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